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Operated esophagus – radiological diagnostics of a 24 year-old man with esophageal atresia associated with congenital tracheo-esophageal fistula. Case report

Artur Maliborski, Grzegorz Nowicki, Paweł Żukowski, Romana Bogustawska

Department of Medical Radiology, Military Medical Institute, Warsaw, Poland

Author's address: Artur Maliborski, Department of Medical Radiology, Military Medical Institute, Szaserów 128, 00-909 Warsaw, Poland, e-mail: maliborski_artur@poczta.onet.pl

Summary

Background:

Esophageal atresia is a condition, in which the terminal portion of the esophagus is impatent. Esophageal stenosis or narrowing may be congenital or acquired. Atresia is usually (>90% of cases) associated with a tracheo-esophageal fistula, in which there is an abnormal continuity between the trachea and the esophagus. The prevalence of esophageal atresia at birth has been estimated at about 1 per 2500 or 1 per 3500 worldwide. We report the case of a 24-year-old man with abdominal pains and anemia. The condition of the man with esophageal atresia after 4 operations was associated with a congenital tracheo-esophageal fistula. The study includes images and conclusions from barium radiography of the upper gastrointestinal tract.

Case Report:

A 24-year-old man was admitted to hospital. Chest X-ray showed an opacity in the middle and inferior field of the right lung. In the Radiology Department at the Military Medical Institute in Warsaw, the course of the upper part of the alimentary canal was investigated, which revealed the presence of the following anastomoses: esophago-colonostomy, colono-ileostomy and ileo-gastrostomy. All the anastomoses were tight and patent. Contrast retention in the extension of colon haustrum was visible. The anastomosed part of the small bowel was considerably distended and presented reflux to a part of the colon. There was an ulcer in the gastric body. The opacity in the middle and inferior field of the right lung was caused by a colon segment and primarily by the distended part of the small intestine.

Conclusions:

The diagnostics of operated esophagus is difficult. A review radiography of the upper gastrointestinal tract segment should be performed, which enables to visualize morphological and functional abnormalities at a relatively low x-ray dose and at low cost. It is considered to be the most sensitive and accurate diagnostic tool.

Key words:

oesophagel atresia • operated oesophagus

PDF file:

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Background

Congenital esophageal atresia belongs to the category of congenital abnormalities dating back to the first two months of embryonal development (weeks 4–6 of gestation). The cause of the malformation is a disturbance of gastrocele differentiation preceding the development of the esophagus and the respiratory system. The defect involves the lack of esophageal continuity. Esophageal atresia usually occurs at the Th2–Th3 level [1]. In 90% of cases, it is accompanied by a tracheo-esophageal fistula. The incidence

of this abnormality is estimated at 1:2500–1:3500 births and accounts for 80% of all developmental abnormalities of the gastrointestinal tract. The esophagus is impatent in 30% of cases of this defect [1,2]. Despite the fact that abnormalities of this type were described for the first time as early as 1696, and the first successful surgical correction was performed in 1939, the prognosis is still serious and the mortality ranges from 5% to 25% [2,3]. The literature usually presents radiological diagnostics of patients with recent diagnoses of esophageal atresia but we did not find any papers presenting the distant outcome of the sur-

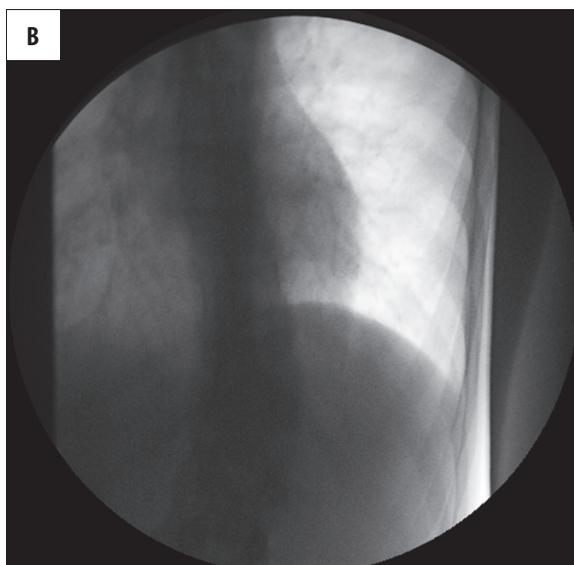
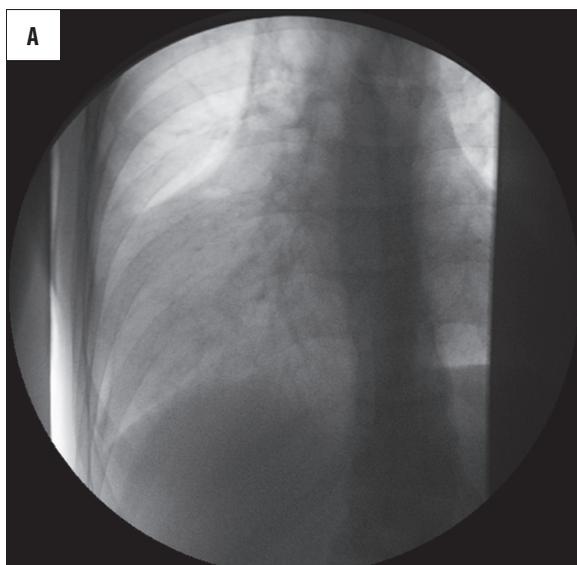


Figure 1A,B. Review radioscopy of the chest and abdomen. An opacity in the middle and bottom field of the right lung.

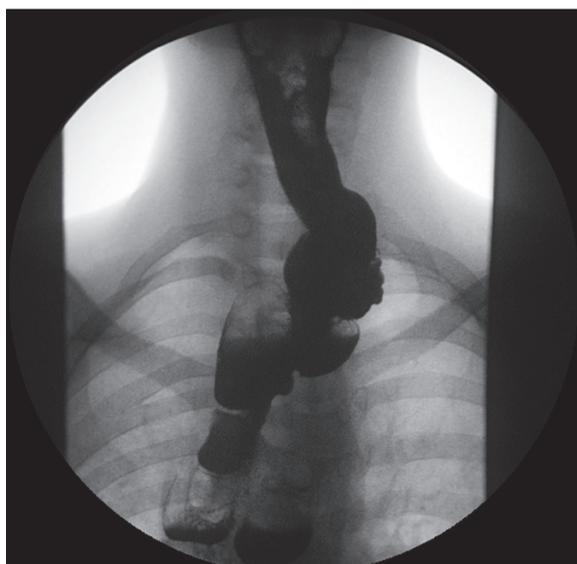


Figure 2. The anastomosed upper part of the esophagus and a part of the colon. Flexure of the reconstructed oesophago-colostomy. AP projection.

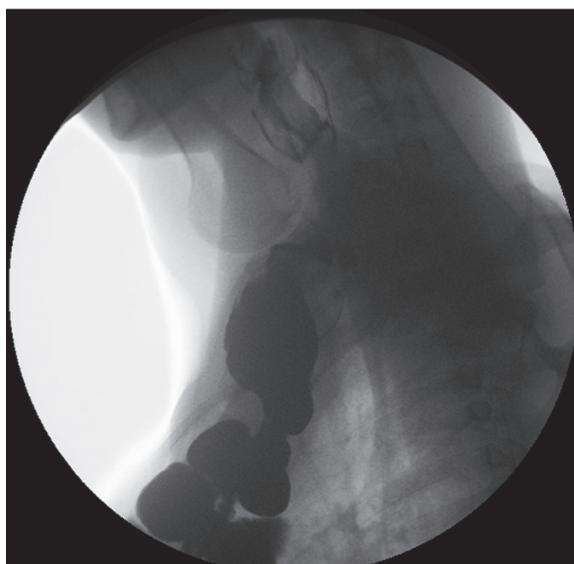


Figure 3. The anastomosed upper part of the esophagus and a part of the colon. Distension of the esophagus proximal to the anastomosis site. Lateral projection.

gery complicated with functional abnormalities and peptic ulceration. The aim of the paper is to describe a case in which subsequent surgical interventions within the gastrointestinal tract led to an atypical condition of the surgically reconstructed esophagus.

Case Report

A 24-year-old man was admitted to hospital with abdominal pains, persisting for a few months, dyspeptic symptoms (frequent eructations, heartburn) and halitosis. The clinical diagnosis of iron deficiency anemia was established. On clinical examination it was confirmed that the patient associated abdominal pains with the iron preparations taken (intolerance), which had led to treatment discontinuation. Anamnesis revealed the history of 4 operations performed on the esophagus because of congenital atresia accompa-

nied by a tracheo-esophageal fistula. Surgical reconstruction of the esophagus had been performed in several stages, with gastrostomy and repair procedure at the site of ulceration of the gastrostomy. A chest x-ray in PA projection revealed extensive and irregular opacities in the middle and inferior field of the right lung. Taking into consideration the patient's history, it was decided to perform a detailed radiological examination of the upper gastrointestinal tract segment.

Preliminary review radiography of the chest and abdominal cavity confirmed the presence of an opacity of unclear origin in the middle and inferior field of the right lung (Figure 1A,B). Further diagnostics, with contrast used, revealed an anastomosis of the upper esophageal segment with the colon, just above the superior aperture of the thorax (Figures 2,3), then, below, ileo-colonostomy (Figures 4,5)



Figure 4. Colo-ileostomy. AP projection.

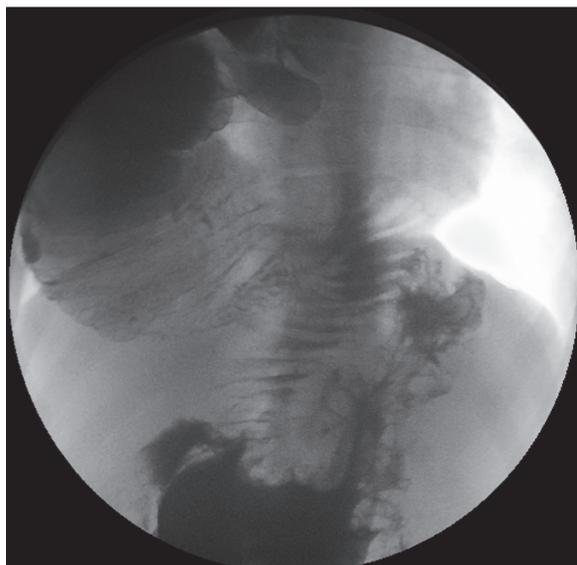


Figure 5. Colo-ileostomy and ileo-gastrostomy. An ulcer in the gastric body. AP projection.

and ileo-gastrostomy (Figure 5). Thus, a fragment of the colon and the small intestine served as an autograft to connect the esophagus to the stomach. All the anastomosis sites were patent and tight. No recanalization of the fistula was found. AP projection radiography visualized an S-shaped flexure of the esophagus and the colon segment graft above and below the anastomosis site. The esophagus was considerably distended above the site of anastomosis with the colon. (Figures 2,3) Contrast medium retention was visible in the diverticular distended haustra of the colon (Figure 6). Its distal end was connected to two distended loops of the small intestine, forming an S-shaped flexure, which also contained a large amount of contrast (Figures 5-9). An ulcer was visualized in the gastric wall (Figure 5). A fragment of the colon, and, first of all, the markedly distended small intestinal loop, were displaced to the right. They caused the opacity visible in the lower and middle field of the right lung. Additionally, reflux from the distended small intes-

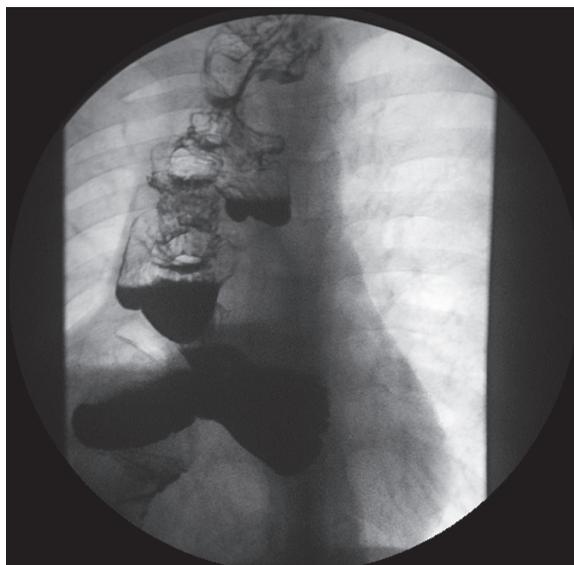


Figure 6. Contrast retention in the distended haustrum of the colon. At the bottom of the figure contrast retention in the distant part of the small bowel. AP projection.

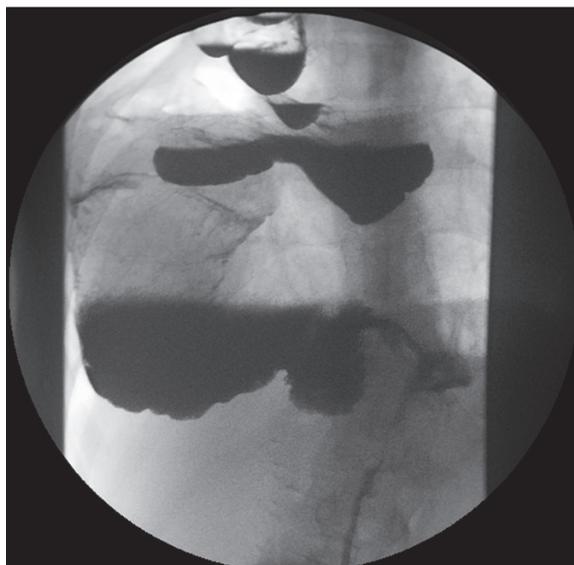


Figure 7. Contrast retention in the distant part of the ileum. At the top of the figure contrast retention in the haustrum of the colon. AP projection.

tinal loop to the esophagus, anastomosed with it, was observed.

Discussion

Congenital esophageal atresia is a well-known developmental abnormality, requiring immediate surgical intervention. Five types of esophageal atresia accompanied by a tracheo-esophageal fistula are distinguished. Their respective incidence rates are given in brackets [3]:

- A (82%) – atresia with distal tracheo-esophageal fistula,
- B (9%) – atresia without a fistula,
- C (6%) – isolated tracheo-esophageal fistula without atresia (so-called type H),
- D (2%) – atresia with proximal and distal fistulas,

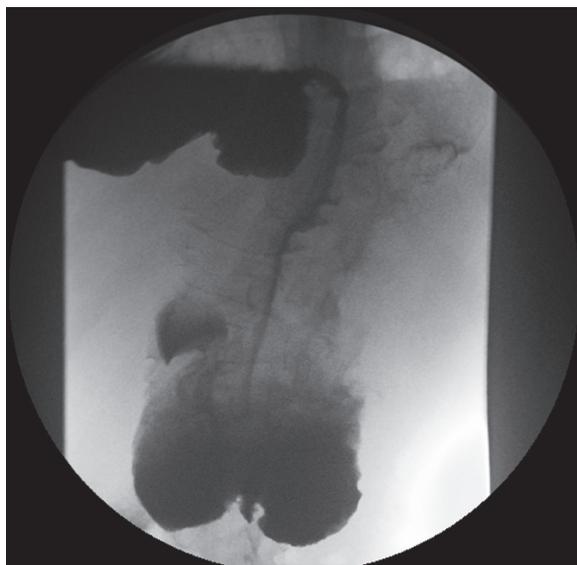


Figure 8. The second, distended ileum loop with retention of a large amount of contrast. AP projection.

E (1%) – atresia with a proximal fistula.

The earliest symptom arousing the suspicion of atresia is hydramnion, resulting from the fact that the baby does not swallow amniotic fluid. Fetal USG can reveal the presence of malformation by visualizing bidirectional flow in the upper esophageal “pocket” with blind ending. In the variant without the presence of a fistula, esophageal atresia is also manifested by the lack of fluid in the stomach and duodenum. In the case of fistula types without any communication between the trachea and the stomach, prenatal USG fails to visualize the stomach of the fetus. In the remaining types of the abnormality, the stomach may be too small or of normal size. Invisibility of the stomach at its typical location in USG should be differentiated with physiological voiding of the stomach or with situs inversus.

A neonate with complete esophageal atresia is born with dyspnea, cyanosis, and inability to swallow the saliva, the excess of which is secreted through the nose. After the removal of mucus from the nasal and oral cavity, the symptoms subside, to occur again after the short time, which is the first symptom of the anomaly. Impossibility of 10–12 F tube insertion because of resistance confirms the diagnosis of atresia [3].

In the cases of communication between the lower esophageal segment and the respiratory tract, radiological examination reveals the presence of air in the stomach and the intestines, whereas if the upper esophageal segment communicates only with the trachea or the bronchial tree, or in atresia without a fistula, the shadow in the abdominal cavity is homogeneous, showing no air bubbles in the stomach and the gut. In order to visualize the level of the fistula and the distance between the ends of the esophagus, barium meal radiography is performed [3,8]. Radioscopy allows not only morphological, but functional examination of the effected structures, as well as continuous diagnostics in various projections at relatively low radiation dose level [7]. Aqueous barium sulphate suspension is a medium preferred for gastrointestinal tract examinations in patients at risk of

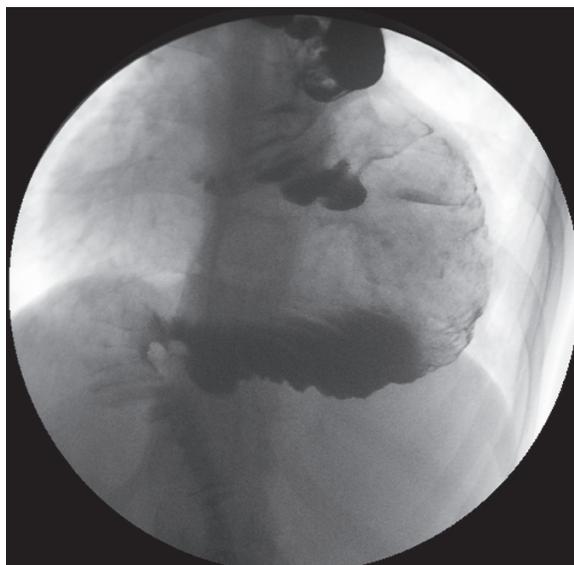


Figure 9. The first, strongly distended ileum loop presenting as an opacity in the right lung middle and bottom fields. Two distended and elongated small bowel loops visible. PA projection.

aspiration of the contrast into the lungs [8]. Non-ionic contrast media are recommended for postoperative assessment of tightness of the performed anastomoses, if the risk of aspiration is low [3].

One-stage surgery with end-to-end anastomosis and ligation of the fistula is the most effective method, used in patients with atresia types making end-to-end anastomosis possible [2]. This technique can be used if the distance between patent esophageal segment is small – up to 2.0–2.5 cm. This solution is the most beneficial, both from the functional and from the anatomical point of view. In other cases, surgical reconstruction is performed in several stages, involving gastrostomy and fistula ligation [2]. In such situations, the ends of two patent segments of the esophagus are connected with each other by anastomosis with a segment of the ileum or the colon. When colon segments are used to connect the esophagus with the stomach, the haustriation is smoothed down with time [5]. The stomach can be also pulled upwards (to the thoracic cavity) and gastrostomy can be performed using various surgical techniques, e.g. by forming the esophagus from the larger curvature, or elongation of the lesser curvature. The ultimate selection of surgical technique depends on the anomaly type, anatomical conditions and usual practice of the specific center.

The most common postoperative complications include: impatency of the anastomosis and stenosis at the suture site, recurrence of the fistula (>10%) [6], gastro-esophageal reflux, esophagitis (>50%), Barret esophagus (6%), motor disturbances (in nearly 100%) [3].

Conclusions

The diagnostic process of an esophagus operated on for atresia accompanied by a tracheo-esophageal fistula can be expected to reveal other anatomical and functional abnormalities of the gastrointestinal tract. Despite the recent

advances in diagnostic methods, contrast radiography of the upper segment of the alimentary canal still remains the method of choice, enabling to visualize both morphological

and functional abnormalities. Consequently, such an examination helps to clarify diagnostic doubts at a relatively low x-ray dose and at low cost.

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